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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,251	03/19/2001	Olivier Leclerc	Q63033	8427

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EXAMINER	
CHAN, ALEX H	

ART UNIT	PAPER NUMBER
2633	2

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/810,251	LECLERC ET AL.	
	Examiner	Art Unit	
	Alex H Chan	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-11,13-17,19-24 and 26-30* is/are rejected.

7)☒ Claim(s) *5,12,18 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claim 1-4, 7-11, 14-17, 20-24, 27 and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,337,755 B1 to Cao in view of U.S. Patent No. 5,515,196 to Kitajima et al (hereinafter Kitajima), and further in view of U.S. Patent No. 5,737,110 to Suzuki et al (hereinafter Suzuki).

Regarding claim 7, Cao discloses a regenerator (13a of Fig. 1) for a wavelength division multiplex optical transmission system (Col. 2, lines 21-25) including a demultiplexer (12 of Fig. 1) supplying demultiplexed channels at its output (e.g. 14a, 14b...14n of Fig. 1); a multiplexer (30 of Fig. 1) receiving said phase-modulated (Col. 4, lines 32-35) signals of each channel and supplying a multiplexed signal (34 of Fig. 1). Cao differs from applicant's invention in that Cao does not disclose for each demultiplexed channel, a multiplexer coupling continuous light with the signals of said channel, an intensity modulator modulating said signals of said channel and said continuous light.

Kitajima discloses for each demultiplexed channel, a multiplexer (e.g. a multiplexer inside 12-1 that couples sources from 1 and 4 of Fig. 4) coupling continuous light (e.g. light outputted from 1 of Fig. 4) with the signals of said channel, an intensity modulator (12-1 of Fig.

4) modulating said signals of said channel and said continuous light (Col. 19, lines 37-42). Therefore, it would have been obvious to one of ordinary skill in the art to modify the all-optical regenerator of Cao to employ an intensity modulator for modulating signals of the channels and continuous light simply for the motivation to provide measures for lowering the phase modulation efficiency relative to the intensity modulation efficiency (Col. 1, lines 35-38). However, though Kitajima discloses phase modulating (e.g. via. 13-1 of Fig. 4) said transmitted signals with said intensity-modulated continuous light (Col. 6, line 50-Col. 7, line 11), Cao in view of Kitajima still fails to disclose a Kerr fiber phase modulating said transmitted signals with said intensity-modulated continuous light by crossed phase modulation.

Suzuki discloses a Kerr fiber (e.g. 118 of Fig. 2) phase modulating said transmitted signals (e.g. CW laser lightwave of Fig. 2) with said intensity-modulated continuous light (e.g. bright soliton lightwave of Fig. 2) by crossed phase modulation (Col. 5, line 62-Col. 6, line10). Accordingly, one of the ordinary would have been motivated to employ a Kerr Fiber for phase modulating to provide a dark soliton superfast, high-capacity optical transmission system which permits prevention of dark soliton interaction while suppressing the timing jitter (Col. 3, lines 7-11). Therefore, it would have been obvious to one of ordinary skill in the art to modify the all-optical regenerator of Cao in view of Kitajima by incorporating a Kerr Fiber for phase modulation as taught by Suzuki because it prevents soliton interaction while suppresses timing jitter.

Regarding claims 8 and 21, Suzuki discloses a continuous light that is supplied by a single source (e.g. 101 of Fig. 1 which supplies light to 108, 109, 110 and 111 of Fig. 1).

Regarding claims 9 and 22, Suzuki discloses an amplifier (102 of Fig. 1) for amplifying said signals from said source.

Regarding claims 3, 10, 16 and 23, Kitajima discloses an intensity modulator that is a Mach-Zender modulator (Col. 6, lines 30-37).

Regarding claims 4, 11, 17 and 24, Cao in view of Kitajima and Suzuki does not disclose a Kerr Fiber that has a non-linearity index greater than $2.7x10^{-20}$ m^2/w. However, since the non-linearity index is well known to be partially based on the constant of the materials chosen for different application, it would have been a matter of a design choice to choose an index that is greater than $2.7x10^{-20}$ m^2/w. This support rational is based on a recognition that the claimed differences exist not as a result of an attempt by applicant to solve a problem but merely amount to selection of expedient known to the artisan of ordinary skill as design choice.

Regarding claims 1, 14 and 20, the limitations introduced by claims 1, 14 and 20 corresponding to the limitations introduced by claim 7. The treatment of claim 7 above reads on the corresponding limitations of claims 1, 14 and 20.

Regarding claims 2, 15 and 30, Cao in view of Kitajima and Suzuki discloses a filter (123a of Fig. 4, Suzuki or 18 of Fig. 1, Cao) downstream of said Kerr fiber (130 or 131 of Fig. 4, Suzuki) for filtering said continuous light (Col. 7, lines 17-28, Suzuki).

Regarding claim 27, Cao in view of Kitajima and Suzuki discloses an optical regeneration method including: coupling (e.g. coupler inside 12-1 of Fig. 4, Kitajima or 117c of Fig. 5, Suzuki) continuous light (light outputted from 1 of Fig. 4, Kitajima or bright soliton lightwave of Fig. 3, Suzuki) with transmitted signals (e.g. output from 4 of Fig. 4, Kitajima or CW laser lightwave of Fig. 3, Suzuki); conjoint intensity modulation of said transmitted signals and said continuous light (e.g. via 12-1 of Fig. 4 and Col. 7, lines 4-6, Kitajima); and phase modulation of said transmitted signals (e.g. via 13-1 of Fig. 4, Kitajima or via 4 of Fig. 1 and Col. 6, lines 15-19, Suzuki) by crossed phase modulation with said intensity-modulated continuous light (Col. 5, line 62-Col. 6, line 3, Suzuki).

3. **Claims 6, 13, 19, 26 and 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Kitajima and Suzuki as applied to claim 7 above, and further in view of U. S. Patent No. 5,857,040 to Bigo et al (hereinafter Bigo).

Regarding claims 6, 13, 19, 26 and 28, Cao in view of Kitajima and Suzuki fails to disclose that the depth of intensity modulation in an intensity modulator is greater than 1 dB and preferably greater than MB. Bigo discloses the depth of intensity modulation in an intensity modulator is greater than 1 dB and preferably greater than 3dB (e.g.3dB, lOdB and 40dB, Fig. 11 and Col. 10, lines 11-26). Accordingly, one of the ordinary would have been motivated to employ an intensity modulation of greater than 1 dB and preferably greater than 3 dB to provide an optical regenerator having the capability to adjust the amplitude and phase modulation (Abstract). Therefore, it would have been obvious to one of artisan skill in the art to modify the all-optical regenerator of Cao in view of Kitajima and Suzuki by incorporating an intensity modulation that is greater than 1 dB and preferably greater than 3 dB as shown by Bigo because this provides an optical regenerator having the capability to adjust the amplitude and phase modulation. Also, the Examiner takes the position that it would have been a matter of design choice to adjust the depth of the intensity modulation to be greater than 1 dB and preferably greater than 3dB.

4. **Claims 29** is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Kitaj ima and Suzuki as applied to claim 7 above, and further in view of U. S. Patent No. 4,914,407 to Itoh.

Regarding claim 29, Cao in view of Kitajima and Suzuki fails to disclose that the phase modulation is effected with a modulation depth of 3 dB. Itoh discloses that the phase modulation is effected with a modulation depth of 3 dB (Fig. 23 and Col. 11, lines 54-60). One of the ordinary skill in the art would have been motivated to employ a phase modulation that is effected with a modulation depth of 3 dB in order to provide a figure of merit of the device which can be compared to other kinds of optical phase modulators. Therefore, it would have been obvious to one of artisan skill in the art to modify the all-optical regenerator of Cao in view of Kitajima and Suzuki by incorporating a phase modulation that is effected with a modulation depth of 3 dB because Itoh suggests that this provides a figure of merit of the device which can be compared to other kinds of optical phase modulators. Also, the Examiner takes the position that it would have been a matter of design choice to adjust the depth of the intensity modulation to be greater than 1 dB and preferably greater than 3dB.

Allowable Subject Matter

5. **Claims 5, 12, 18 and 25** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Roberts et al is cited to illustrate a splitter (demultiplexer), series of modulators and a combiner in a soliton optical communication system (Fig. 3). Liu et al is cited to show the Kerr Fiber having non-linearity index (Col. 1, line 60-Col. 2, line 7). Jabr is cited to show two light sources, a multiplexer and a Mach-Zehnder (Fig. 2). Akiyama et al is cited to show two LD sources, two optical modulators, a pulse generator and an optical filter. Ishikawa et al is cited to demonstrate a Mach-Zehnder having two inputs and an optical modulation device (Fig. 14 and 29). Shake et al is cited to show a WDM demultiplexer and multiplexer having phase modulator and amplitude modulators (Fig. 2A and 2B and 4A). The et al is cited to show a phase modulator and an intensity modulator (Col. 18, lines 36-44). Veselka et al is cited to show a demux, optical modulators and a combiner (Fig. 7). Uchiyama et al is cited to show the Kerr Medium, filters, demultiplexer and multiplexer (Fig. 17A, 20 and 29). Desurvire et al is cited to show a WDM network comprising regenerators (Fig. 4). Watanabe is cited to demonstrate an optical coupler, an input, a continuous light source and filters (Fig. 27). Kashima is cited to show an intensity modulator (Fig. 9) and amplifiers (Fig. 11). Ooi et al is cited to show optical modulators having one single source (70 of Fig. 14).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex H Chan whose telephone number is (703) 305-0340. The examiner can normally be reached on Monday to Friday (8am to 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Alex Chan
Patent Examiner, Art Unit 2633
December 2nd, 2003

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